

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application.

1. (Currently Amended) An electrosurgical device to treat tissue in a presence of radio frequency power and a fluid provided simultaneously from a distal portion of the device, the device having a proximal end and a distal end and comprising:

a handle;

a shaft extending from the handle, the shaft supporting an electrode tip in rigid relation to the handle and having a distal end;

a fluid passage being connectable to a fluid source of the fluid;

the electrode tip comprising a single metal contact element providing an electrode having a distal portion and a proximal portion, at least a the distal portion of the electrode extending distally beyond the distal end of the shaft, the proximal portion of the electrode being contained within the shaft;

the distal portion of the electrode ~~extending distally beyond the distal end of the shaft~~ comprising an electrically conductive cone shaped portion, the cone shaped portion having a circular portion which narrows towards the distal end of the device along an electrically conductive cone shaped surface; and

at least one fluid outlet opening in fluid communication with the fluid passage, wherein the at least one fluid outlet opening is located at the distal end of the shaft and is defined by the distal end of the shaft and a portion of the electrode adjacent the distal end of shaft.

2. (Previously Presented) The device according to claim 1 wherein:
the at least one fluid outlet opening is arranged to provide the fluid from the fluid source to the electrode.

3. (Previously Presented) The device according to claim 1 wherein:
at least a portion of the electrically conductive cone shaped surface has a contact angle (θ) with the fluid from the fluid source thereon of less than 90 degrees.

4. (Currently Amended) The device according to claim [[1]] 5 wherein:
the at least one fluid outlet opening is located at the distal end of the shaft and is defined by both the interior surface of the cavity and an exterior surface of the shank portion adjacent the distal end of shaft.

5. (Currently Amended) The device according to claim [[4]] 21 wherein:
the neck portion of the electrode includes a shank portion ~~the at least one fluid outlet opening located at the distal end of the shaft is located between a portion of the electrode contained within a cavity of the shaft~~ [[and]] proximal to the distal end of the shaft.

6. (Currently Amended) The device according to claim 1 wherein:

the at least one fluid outlet opening is defined by an interior surface of the distal end of the shaft and an exterior surface of the portion of the electrode adjacent the distal end of shaft ~~is sheltered by the device from having direct contact with the tissue.~~

7. (Currently Amended) The device according to claim 6 wherein:

the at least one fluid outlet opening faces in a direction that is substantially perpendicular to a surface of the tissue being treated and ~~sheltered by the device from having direct contact with the tissue~~ is sheltered by the shaft from having direct contact with the tissue being treated.

8. (Currently Amended) The device according to claim 1 further comprising:

means to shelter the at least one fluid outlet opening from having direct contact with the tissue being treated.

9. (Original) The device according to claim 8 wherein: the means to shelter

the at least one fluid outlet opening comprises the shaft.

10. (Previously Presented) The device according to claim 1 further comprising: a plurality of fluid outlet openings.

11. (Previously Presented) The device according to claim 10 wherein:

the plurality of fluid outlet openings are arranged to provide the fluid from the fluid source around the electrode.

12. (Currently Amended) The device according to claim 10 wherein:

the plurality of fluid outlet openings are located at the distal end of the shaft and are defined by the distal end of the shaft and the exterior surface of the portion of the electrode adjacent the distal end of shaft.

13. (Currently Amended) The device according to claim 10 wherein:

the plurality of fluid outlet openings comprise four equally spaced openings located at the distal end of the shaft, each opening being defined by the distal end of the shaft and the exterior surface of the portion of the electrode adjacent the distal end of shaft.

14. (Currently Amended) The device according to claim 1 further comprising:

at least one recess formed in an exterior surface of the distal portion of the electrode, the at least one recess to provide an elongated fluid flow channel for the fluid from the fluid source to flow distally along the exterior surface of the distal portion of the electrode.

15. (Currently Amended) The device according to claim 14 further comprising:

a plurality of recesses, each recess to provide a fluid flow channel for the fluid from the fluid source to flow distally along the exterior surface of the electrode.

16. (Currently Amended) The device according to claim 14 wherein: the at least one recess is in fluid communication with the at least one fluid outlet opening and extends distally from the at least one fluid outlet opening.

17. (Original) The device according to claim 14 wherein: the number of recesses is equal to the number of fluid outlet openings.

18. (Currently Amended) An electrosurgical device to treat tissue in a presence of radio frequency power and a fluid provided simultaneously from a distal portion of the device, the device having a proximal end and a distal end and comprising:

a handle;

a shaft extending from the handle, the shaft supporting an electrode tip in rigid relation to the handle and having a distal end;

a fluid passage being connectable to a fluid source of the fluid;

the electrode tip comprising a single metal contact element providing an electrode, at least a portion of the electrode extending distally beyond the distal end of the shaft;

the portion of the electrode extending distally beyond the distal end of the shaft comprising a neck portion and an enlarged end portion, the enlarged end portion located distal to the neck portion and comprising an electrically conductive cone shaped portion, the cone shaped portion having a circular portion which narrows towards the distal end of the device along an electrically conductive cone shaped surface; and

at least one fluid outlet opening in fluid communication with the fluid passage,
wherein the at least one fluid outlet opening is located at the distal end of the shaft and is defined by the distal end of the shaft and an exterior surface of the electrode at a proximal end of the neck portion which is adjacent the distal end of shaft.

19. (Previously Presented) The device according to claim 18, wherein:

the at least one fluid outlet opening is arranged to provide the fluid from the fluid source to the electrode.

20. (Previously Presented) The device according to claim 18 wherein:

at least a portion of the electrically conductive cone shaped surface has a contact angle (θ) with the fluid from the fluid source thereon of less than 90 degrees.

21. (Currently Amended) An electrosurgical device to treat tissue in a presence of radio frequency power and a fluid provided simultaneously from a distal portion of the device, the device having a proximal end and a distal end and comprising:

a handle;

a shaft extending from the handle, the shaft supporting an electrode tip in rigid relation to the handle and having a distal end;

a fluid passage being connectable to a fluid source of the fluid;

the electrode tip comprising a single metal contact element providing an
electrode, at least a portion of the electrode extending distally beyond the distal end of the shaft;

the portion of the electrode extending distally beyond the distal end of the shaft comprising a neck portion and an enlarged end portion, the enlarged end portion located distal to the neck portion and comprising an electrically conductive cone shaped portion, the cone shaped portion having a circular portion which narrows towards the distal end of the device along an electrically conductive cone shaped surface; [[and]]

at least one fluid outlet opening in fluid communication with the fluid passage, ~~the fluid outlet opening arranged to provide a fluid from the fluid source to the neck portion of the electrode; and~~

at least one recess formed in an exterior surface of a proximal end portion of the neck portion of the electrode, the at least one recess being in fluid communication with the at least one fluid outlet opening and providing an elongated fluid flow channel for the fluid from the fluid source to flow distally along the exterior surface of the neck portion of the electrode.

22. (Previously Presented) The device according to claim 21 wherein:

at least a portion of the electrically conductive cone shaped surface has a contact angle (θ) with the fluid from the fluid source thereon of less than 90 degrees.

23. (Currently Amended) An electrosurgical device to treat tissue in a presence of radio frequency power and a fluid provided simultaneously from a distal portion of the device, the device having a proximal end and a distal end and comprising:

a handle;

a shaft extending from the handle, the shaft supporting an electrode tip in rigid relation to the handle and having a distal end;

a fluid passage being connectable to a fluid source of the fluid;

the electrode tip comprising a single metal contact element providing an electrode, at least a portion of the electrode extending distally beyond the distal end of the shaft;

the portion of the electrode extending distally beyond the distal end of the shaft comprising a neck portion and an enlarged end portion, the enlarged end portion located distal to the neck portion and comprising an electrically conductive cone shaped portion, the cone shaped portion having a circular portion which narrows towards the distal end of the device along an electrically conductive cone shaped surface; [[and]]

at least one fluid outlet opening in fluid communication with the fluid passage, ~~the fluid outlet opening arranged to provide a fluid from the fluid source towards the enlarged end portion of the electrode; and~~

at least one longitudinally extending recess formed in an exterior surface of a proximal end portion of the neck portion of the electrode, the at least one longitudinally extending recess being in fluid communication with the at least one fluid outlet opening and providing an elongated fluid flow channel extending between the distal end of the shaft and the enlarged end portion of the electrode for the fluid from the fluid source to flow distally along the exterior surface of the neck portion of the electrode towards the enlarged end portion of the electrode.

24. (Previously Presented) The device according to claim 23 wherein:

at least a portion of the electrically conductive cone shaped surface has a contact angle (θ) with the fluid from the fluid source thereon of less than 90 degrees.

25. (Currently Amended) An electrosurgical device comprising:

a handle;

a shaft extending from the handle, the shaft supporting an electrode tip in rigid relation to the handle;

a fluid passage being connectable to a fluid source of a fluid;

the electrode tip comprising a single metal contact element providing an electrode having an electrically conductive cone shaped portion, the cone shaped portion having a circular portion which narrows towards the distal end of the device along an electrically conductive cone shaped surface; [[and]]

at least one fluid outlet opening in fluid communication with the fluid passage, the fluid outlet opening arranged to provide the fluid from the fluid source to the electrode; and

at least one recess formed in an exterior surface of a proximal end portion of the electrode contained within a cavity of the shaft proximal to a distal end of the shaft, the at least one recess providing an elongated fluid flow channel in fluid communication with the at least one fluid outlet opening which is defined by the interior surface of the cavity and the exterior surface of the proximal end portion of the electrode.

26. (Previously Presented) The device according to claim 25 wherein:

at least a portion of the electrically conductive cone shaped surface has a contact angle (θ) with the fluid from the fluid source thereon of less than 90 degrees.

27.-39. (Cancelled)

40. (Previously Presented) The device of claim 1 wherein:

the electrode further comprises a distal end, and

the distal end of the electrode is blunt.

41. (Previously Presented) The device of claim 40 wherein:

the cone shaped portion of the electrode is located adjacent to the blunt distal end of the electrode.

42. (Previously Presented) The device of claim 1 wherein:

the electrode further comprises a distal end, and

the distal end of the electrode is spherical.

43. (Previously Presented) The device of claim 42 wherein:

the cone shaped portion of the electrode is located adjacent to the spherical distal end of the electrode.

44. (Previously Presented) The device of claim 42 wherein:

the spherical distal end of the electrode comprises a hemisphere of about 180 degrees.

45. (Previously Presented) The device of claim 1 wherein:

the cone shaped portion further comprises a concentric cone shaped portion.

46. (Previously Presented) The device of claim 1 wherein:

the cone shaped portion further comprises an eccentric cone shaped portion.

47. (Currently Amended) A surgical method for treating tissue comprising:

providing tissue having a tissue surface;

providing radio frequency power and a fluid to an electrosurgical device having a distal end portion which simultaneously provides the radio frequency power and the fluid to a tissue treatment site, the distal end portion comprising at least one fluid outlet opening and a single metal contact element providing an electrode having an electrically conductive cone shaped portion, the cone shaped portion having a circular portion which narrows towards the distal end of the device along an electrically conductive cone shaped surface, the electrode having at least one recess formed in an exterior surface thereof, the at least one recess being in fluid communication with the at least one fluid outlet opening and providing an elongated fluid flow channel for the fluid to flow distally along the exterior surface of the electrode;

providing the fluid from the electrosurgical device;

forming a localized fluid coupling with the fluid which couples the tissue surface and the electrode, the fluid coupling localized at the distal end portion of the electrosurgical device;

providing the radio frequency power to the tissue;

moving the electrode of the electrosurgical device along the tissue;

coagulating the tissue; and

blunt dissecting the tissue with the cone shaped portion of the electrode.